

known. Various types of zeolites of which the structure has been clarified, and the atomic configuration in such known different types of zeolites are described in Atlas of Zeolite Structure Types (W.M. Meier, D.H. Olson, Ch. Baerlocher, Zeolites, 17(½), 1996; Reference 1). In the section of Channels in Reference 1, they show the crystallographic free diameter. The free diameter values are based on any oxygen radius of 0.135 nm. In this shape, both the maximum value and the minimum value are shown for a noncircular aperture. In this reference, the pore aperture is stereoscopically drawn as Fig. 1, and both its maximum value and the minimum value are given therein. The maximum value and the minimum value of the pore aperture referred to in the invention is just the values shown in the reference. For all types of zeolites clarified in Reference 1, their data of aperture size given in Reference 1 are referred to herein, irrespective of their composition, for judging their applicability to the invention (in fact, however, the pore size will vary, depending on the composition and the ambient temperature). For the others not shown in Reference 1 but disclosed in any other references such as journals and the like, their applicability to the invention ~~will be judged in point of~~ is determined from the pore aperture diameter from their structure disclosed in such other references.

**Page 14, first paragraph:**

From the zeolite-containing catalyst, in general, crystal water existing therein and organic substances used in producing it and ~~still~~still remaining therein are removed before use. In general, it may be heated at 200 to 600°C, whereby crystal water and the organic substances can be almost completely removed from zeolite.

**Version with Markings to Show Changes to the Claims**

Kindly amend the claims as follows:

1. (Twice Amended) A method for isomerizing aromatic compounds, which comprises contacting at least one aromatic compound with a zeolite-containing catalyst having a pore structure of controlled diameter, ~~and in which the said~~ zeolite ~~is being~~ characterized in that:

(1) when said pore aperture has a circular or a non-circular cross section and accordingly has a minimum diameter and a maximum diameter, the minimum value of the pore aperture diameter of the major channels therein is larger than 0.65 nanometers, ~~or~~ and the maximum value thereof is larger than 0.70 nanometers, and wherein

(2) ~~the said~~ major channels do not intersect any others with having larger apertures than an oxygen 10-membered ring;  
and ~~the~~ wherein said aromatic compounds are ~~at least one~~ selected from the group consisting of:

- (a) aromatic compounds having at least three substituents,
- (b) aromatic compounds having two substituents of which at least one is a halogen or has at least 2 carbon atoms, and
- (c) naphthalene or anthracene derivatives having substituent(s).

2. (Twice Amended) The method for isomerizing aromatic compounds as claimed in claim 1, wherein ~~the said~~ minimum value of the pore aperture diameter of ~~the said~~ major channels in the zeolite is ~~not smaller than~~ 0.7 nanometers or above.

3. (Twice Amended) The method for isomerizing aromatic compounds as claimed in claim 1 or 2, wherein the pore aperture size of ~~the said~~ major channels in the zeolite is larger than an oxygen 12-membered ring.

7. (Amended) The method according to Claim 1, wherein the maximum value of athe pore entrance diameter is at most 1.1 nm.

### Remarks

We note with appreciation the Examiner's withdrawal of all rejections based upon §102. In that connection, we note the Examiner's reference to an amendment "filed on January 17, 2002"; there must have been a delay in the mail because we submitted the Amendment and Argument under date of November 28, 2001. If there is any problem in regard to timing, we would much appreciate the Examiner's comment.

We also note the Examiner's courteous concessions regarding the fact that the prior art does not disclose the specific aromatic compounds claimed in Claims 1, 4 and 5 and does not disclose the crystal size of Claim 10. We submit, further, that the prior art does not disclose the specific zeolites selected from the group consisting of SSZ-31, VFI, AET, AFI, AFR, AFS, ATS, BOG, BPH, DFO, GME, LTL, MAZ, MEI, OFF, CFI, UTD and having large pores of which the pore entrance diameter is larger than an oxygen 12-membered ring pore. Nor does the prior art disclose the specific details set forth in new Claims 7-12.

It is important to emphasize that the claims of the case relate to isomerization, which isomerization is performed within a molecule. As we have previously discussed, disproportionation and transalkylation are radically different as they are conducted between one molecule and another molecule.

Referring to the cited references Davis, Zones and WO 97, the amended claims of the present application relate to a method for isomerizing, comprising contacting a specific catalyst with specifically identified aromatic compounds. Further, the three cited references neither teach nor suggest the effect of the particular catalyst for the purpose of isomerization, this being a very important feature of the claims of the instant application.

Claim 1 has been amended to emphasize that, when the pore aperture has a circular or a non-circular cross-section and accordingly has a minimum diameter and a maximum diameter, the minimum value of the pore diameter aperture of the major channels within the

zeolite is larger than 0.65 nanometers, and the maximum value thereof is larger than 0.70 nanometers. Further, it is stated in Claim 1, paragraph 2 that these major channels do not intersect with any others having larger apertures than an oxygen 10-membered ring.

Claim 1 has also been amended as to form in order to submit appropriate language for the Markush grouping. Other formal revisions have been made in Claims 2, 3 and 7.

As has been pointed out in the Specification, catalytic isomerization is a highly unpredictable process, which gives results that are very difficult to foresee, even by a person having a high degree of skill in the art. Isomerization of large size molecules in the presence of zeolite having small pores or intersecting pore channels is not only problematic but highly difficult to achieve, because the molecules are unable to rapidly diffuse to and through the pores to achieve efficient or rapid isomerization. It is not a simple thing to just create a new zeolite crystal and achieve excellent and rapid isomerization.

Alkylation and transalkylation involve the transfer of an alkyl group from one molecule to a reactant molecule, and is to be sharply distinguished from the claimed isomerization reaction. In the references, the focus is upon alkylation and transalkylation; even WO 97 discloses only alkylation and transalkylation of aromatic hydrocarbon feed stocks.

It should be kept uppermost in mind that any process involving isomerization of halogenated aromatic compounds as defined in claim 1, sub-paragraph (b) leads to a severe risk of dehalogenation. It is essentially unpredictable what would happen to an aromatic compound having two substituents of which one is a halogen. Unlike the ordinary aromatic compounds referred to in the prior art, the halogenated aromatic compounds created by rapid isomerization in accordance with the present invention have surprisingly been found effective, because the bulky halogenated aromatic compounds are able to diffuse easily through the Applicants' newly-discovered zeolite catalysts, without risk of being

dehalogenated. This is an important and advantageous distinction, not disclosed or suggested by the prior art.

We submit herewith the recently executed Declaration of Dr. Yoshikawa, which *factually* distinguishes the invention over the cited art and points to the severe difficulties facing an experimenter in dealing with isomerization of aromatic compounds having (a) at least three substituents, or (b) having a halogen as one of two or more substituents, or (c) naphthalene or anthracene derivatives having substituent(s).

In view of the sharp amendments that have been introduced into the claims and in view of the foregoing distinctions, we ask that the Declaration be entered in the official file, and earnestly submit that all of the claims, as amended, are in proper form for complete allowance, which action is respectfully requested.

Respectfully submitted,

*Pz 31750*

Austin R. Miller  
Reg. No. 16,602  
Attorney for Applicants

ARM:dh  
(215) 563-1810